June 6, 1967

TO: Dan Bobrow and Bert Sutherland
FROM: J. C. R. Licklider
SUBJECT:

The Purpose and Content of BONOFORM alias SUTHERN COMFORT

Introduction

Bobrow, Sutherland and Licklider constitute a committee of the ARPA network circle. The purpose of the committee is in the general vicinity of x, where x is to do something about protocol, formats, conventions, or language for messages transmitted through the ARPA network. The purpose of this memorandum is to clarify the purpose of the committee and to relate the general nature of the expected product of the committee to the context of the ARPA network. This memorandum will not describe the expected product.

The expected product of the committee is a language for defining message forms of formats. As suggested opposite "Subject," I am proposing to call the language either "Bobrow Normal Form" or "Sutherland Network Communication Format." "Bonoform" has the advantage of compactness and will be used in the remainder of this memorandum.

Context and Purpose

The ARPA network circle meeting of May 18, 1967, decided, among other things, to adopt the Interface Message Processor concept and to use ASCII code and its rules without deviation in the interior communication language of the network. Each IMP will be either (preferably) a small computer or (acceptably) a functional part of a large one. In the former case, the interface between the local part of the node and the part of the node dominated by network-wide conventions will be a software-software interface inside the IMP. In the latter case, the part of the large computer dominated by network-wide conventions will perforce look to the communication lines and to the rest of the node exactly like an IMP. The interior communication language, which I shall

abbreviate INTERCOM (or Intercom, since - perhaps because of their relative unavailability - I prefer lower-case letters), is the language that flows through the communication lines and switches and within the part of the IMPs that are dominated by network-wide conventions. The meeting of May 11 made progress toward the specification of format for Intercom messages. However, only the headers and trailers of such messages are strongly constrained by the specifications. All that is said about the bodies of such messages is that they shall conform with the ASCII rules. Insofar as the body messages are made up of characters, the characters must be ASCII characters of seven identifying bits and one parity bit. Insofar as the body messages contain pure binary information, it must be 6-bit binary; the other two bits are preempted by ASCII constraints.

As the primitive mind works, the next question concerns further specification of the language of the body (i.e., not Intercom header or trailer) messages. However, the minds of two-thirds of the present committee are not primitive. The next question therefore concerns not the body language itself but a language for describing the formats of body messages. This message-format-describing language is what I am calling Bonoform.

Chalmers Sherwin has been (and is) advocating a system for handling the problem of formats for messages of the kind with which we are concerned. Two elements of his system are a standards office and a standard header. Anyone can invent or define a format, send it to the standards office, and (if it meets the simple rules) have it registered, assigned a format number, and listed. Then, when he sends a message, he need only put the format number in its proper place in the standard header. In the body that follows the header, he transmits whatever the format calls for, and his recipient, who presumably has a copy of the format description, decodes, or interprets the message accordingly.

Instead of relying on the standards office, of course, one could

send the format description as a message, providing the format of the format description were agreed upon by both sender and receiver. It is precisely the purpose of Bonoform to define the format of format description and other parts of the language of message descriptions.

Schedule of Work

At a committee meeting yesterday, the general character of Bonoform was agreed upon. It will be somewhat like Backus Normal Form. It will provide for assignments of character (i.e., characterization) and for assignments of value. All variables that may be assigned values will be global. Characterization may be hierarchical. That is, a format may be defined by a statement containing terms that are defined (i.e., formats that are characterized) in other statements. And so on. But the language is intended to be very simple. It will not be a programming language.

Bobrow and Sutherland see problems arising, problems familiar to them in other experiences in the field of formal languages. Bobrow is going to write up a preliminary description of the language and a brief discussion of the problems.

Then there will be another committee meeting.

The target date for unveiling of the language is July 1, 1967.

TO: J. C. R. Licklider, W. R. Sutherland
(copies to: Robert Taylor, Larry Roberts, and ARPA Network File

FROM: D. G. Bobrow

SUBJECT: A Modified BNF Notation (BoNaForm) for Describing Network Messages - Preliminary Note

DATE: 8 June 1967

Quoted Strings

There are two classes of quoted strings - character strings and numeric strings. When used in describing messages, character strings are surrounded by double quotes (") e.g. "AB CDE". Numeric strings are surrounded by "single" quotes (') and followed by a base indication, i.e. B=Binary, Q=Octal, D=Decimal, H=Hexidecimal.

e.g. '1101'B or '377'Q etc.

Reserved Words

BIT	A Bit
CHAR	Any Character
SQ	A single quote
DQ	A double quote
FP	Floating point number
etc.	As needed

Characterization Statements

A characterization statement characterizes a message form, similar to a definition statement in BNF. The left side is a single name (a message or submessage name) followed by an equals sign (=) followed by submessages separated by + for concatenations. Alternatives are indicated separating sets of